2015 Climate Review for Puerto Rico and the U.S. Virgin Islands.

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2015 can be described as a dry and hot year across Puerto Rico (PR) and the U.S. Virgin Islands (USVI). Below normal sea surface temperatures across the tropical Atlantic waters due to strong trades resulted in limited rainfall activity March through at least May (Fig 1 and 2). Dry conditions continued May through early August as moderate El Niño conditions* established. Although strong to very strong El Niño conditions persisted during the autumn and winter, the local weather regime shifted around mid-August as Tropical Storm Erika (Fig 3), the remnants of Danny and former Tropical Storm Grace moved across the eastern Caribbean. Wetting rains associated with these features were beneficial, but not enough to alleviate the extreme drought conditions across the local islands (Fig 4).

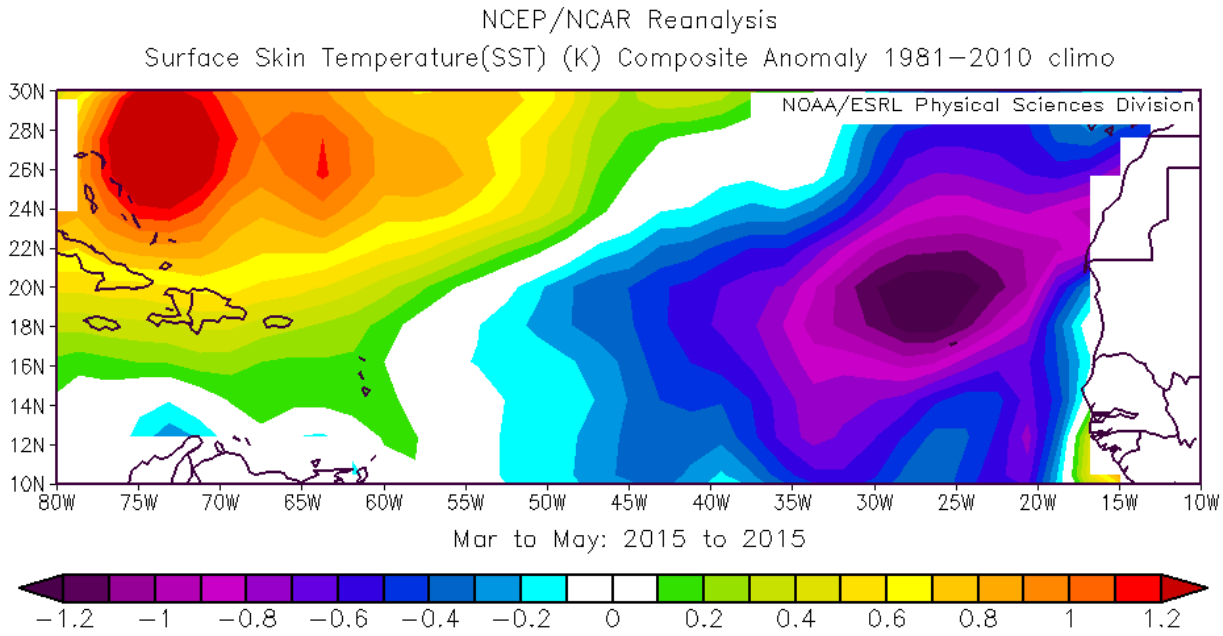


Figure 1. Sea Surface Skin Temperature (SST) Anomaly.

*For El Niño conditions and development visit http://www.cpc.ncep.noaa.gov/

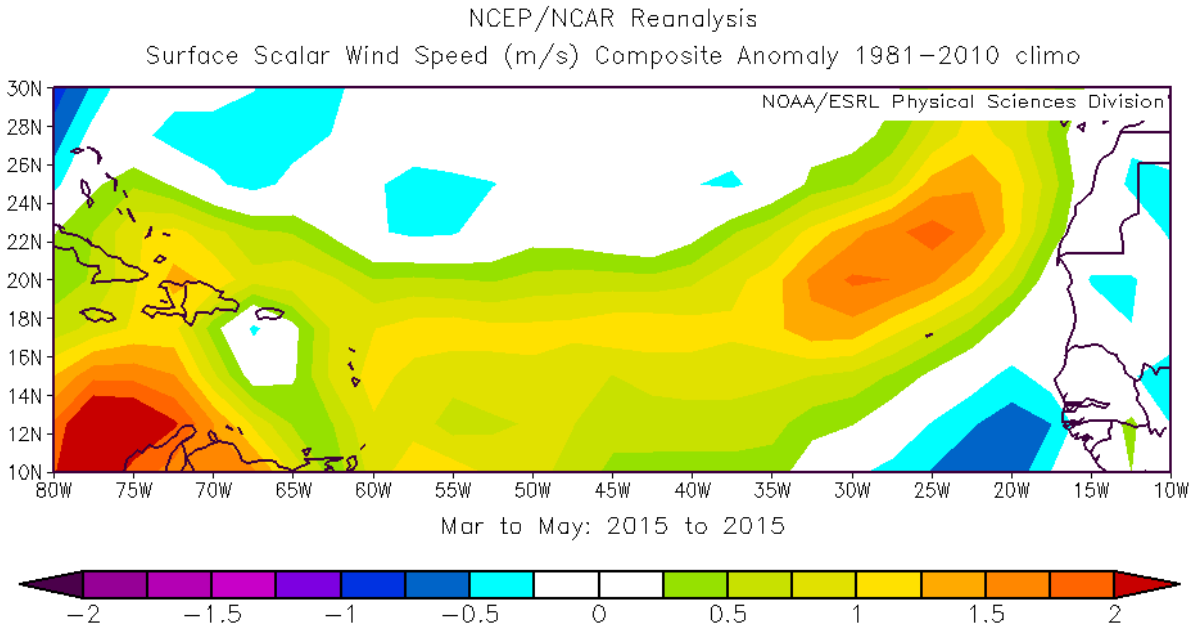


Figure 2. Surface Scalar Wind Speed Anomaly.

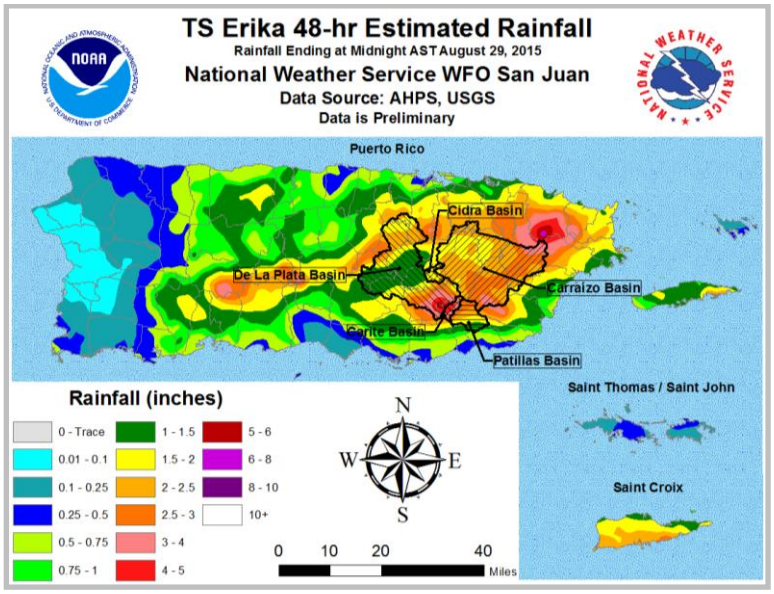


Figure 3. Rainfall Totals Associated with Tropical Storm Erika.

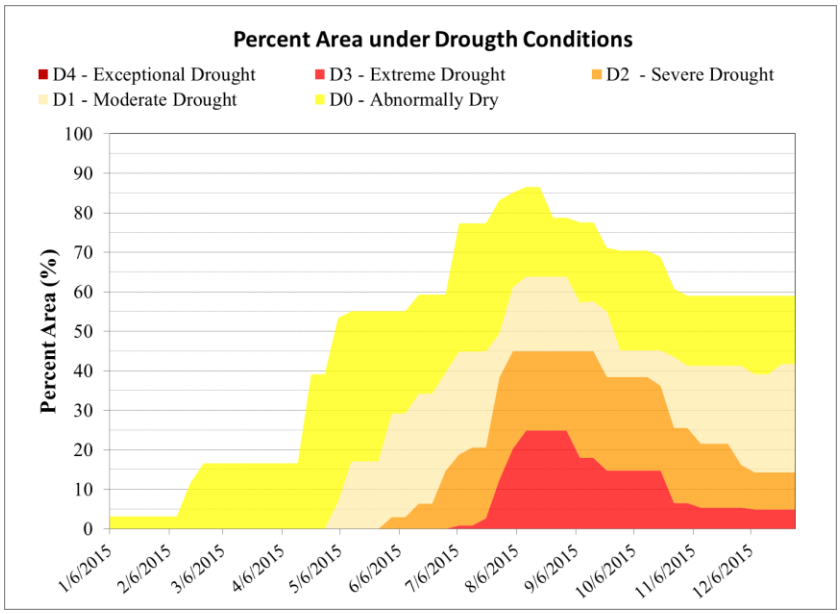


Figure 4 . Percent Area of PR under USDM Drought Categories.

Atmospheric conditions favorable for shower and thunderstorm development were finally observed the second half of October with showers and thunderstorms every day. Widespread showers and thunderstorms associated with an upper level trough were observed during the weekend of October 24-25th.

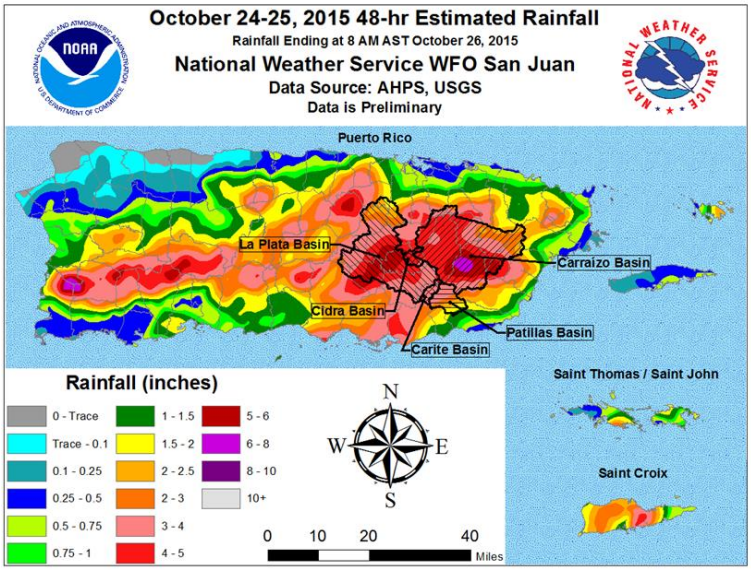


Figure 5. Rainfall Totals for October 24-25th.

Rainfall accumulations associated with this feature averaged between 4 and 5 inches across the eastern interior of PR (Fig 5). Extreme drought conditions (D3) improved to severe drought (D2) across these areas as catchment basins began to respond (Fig 4).

Statistically, November and December were near normal with passing showers observed along windward areas in the morning, followed by locally induced showers and thunderstorms in the afternoon. Stronger than normal low level easterly winds increased the frequency of trade wind showers across windward areas (Fig 6). As a result, the highest rainfall totals during November and December were mainly focused across the USVI, the east coastal areas of PR as well as over and north of the Cordillera Central and Sierra de Cayey.

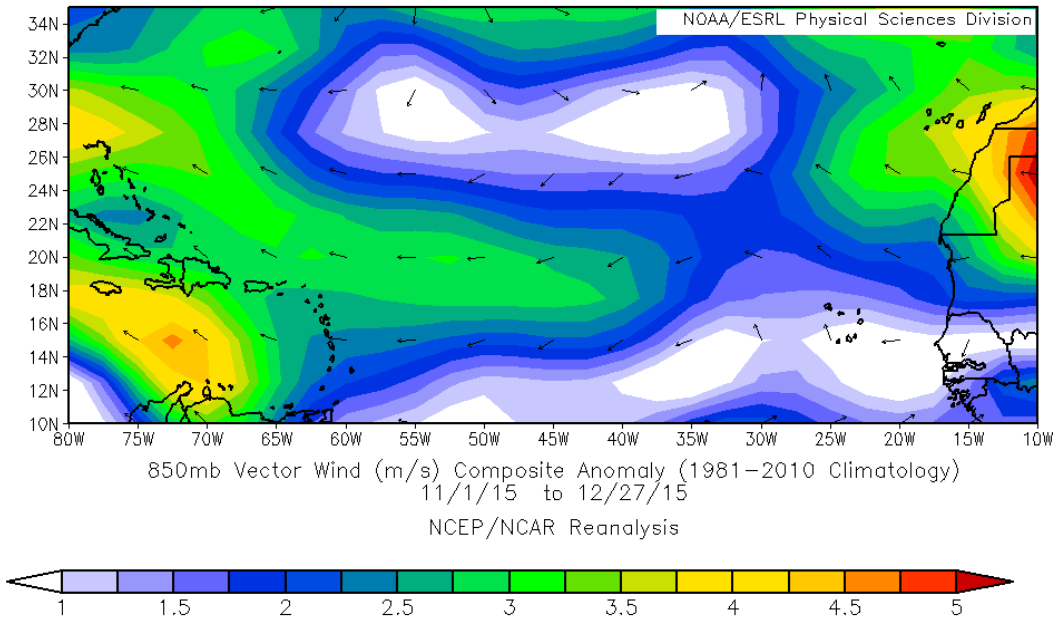


Figure 6. Wind Speed Anomalies at 850 MB (1.5 km above surface) during November and December 2015.

Based on the Cooperative Observer Network Data (COOP), only a 60 % of the normal rainfall was observed across Puerto Rico from March through July, July being the driest month of 2015 across all islands. Preliminarily, 2015 ended as the 6th driest year across PR with an average rainfall total of 51.64 inches, which is 12.89 inches below normal (Table 1 and 4). Across St Thomas/St John and St Croix, an average rainfall total of 26.52 and 30.29 inches was observed which is 17.04 and 9.29 below normal, respectively (Table 2 and 3).

For rainfall accumulation and percent of normal per climate zones visit http://www.srh.noaa.gov/sju/?n=averagerainfall.

In terms of temperature, the mean annual temperature for PR was 78.1ºF which is approximately 1.3ºF warmer than the 30-year average from the National Centers for Environmental Information (NCEI). In fact, 2015 ended as the warmest year on record across PR. This pattern of above normal temperatures was observed across most of the Caribbean region (Fig 7).

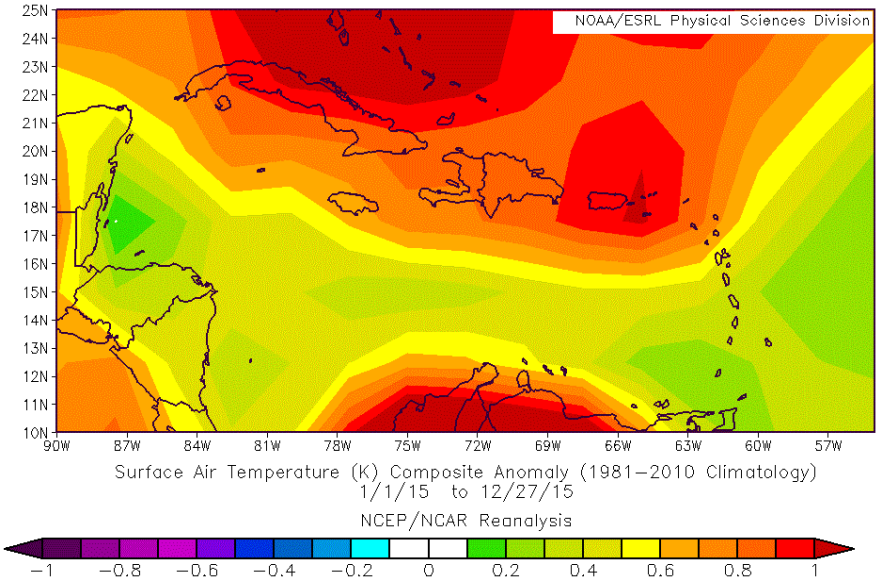


Figure 7. Air Temperature Anomalies for the Caribbean from Jan 1 - Dec 27 2015.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Observed	3.58	4.15	2.71	3.33	4.15	2.39	2.35	6.00	6.07	7.44	6.81	2.66
Normal	3.41	2.66	2.94	4.85	7.21	4.68	5.13	6.22	8.12	8.30	6.88	4.13
% PON per month	105	156	92	69	58	51	46	96	75	90	99	64
Accumulated	3.58	7.73	10.44	13.77	17.92	20.31	22.66	28.66	34.73	42.17	48.98	51.64
Normal accumulation	3.41	6.07	9.01	13.86	21.07	25.75	30.88	37.10	45.22	53.52	60.40	64.53
% PON accumulated	105	127	116	99	85	79	73	77	77	79	81	80

Table 1. 2015 Rainfall Totals and Percent of Normal (PON) across Puerto Rico.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Observed	1.46	3.92	1.26	0.30	0.24	1.97	0.39	2.94	1.48	3.77	5.85	2.94
Normal	2.72	1.71	1.47	2.92	3.90	2.54	3.33	3.78	5.34	5.31	6.80	3.74
% PON per month	54	229	86	10	6	78	12	78	28	71	86	79
Accumulated	1.46	5.38	6.64	6.94	7.18	9.15	9.54	12.48	13.96	17.73	23.58	26.52
Normal Accumulation	2.72	4.43	5.90	8.82	12.72	15.26	18.59	22.37	27.71	33.02	39.82	43.56
% PON Accumulated	54	121	113	79	56	60	51	56	50	54	59	61

Table 2. 2015 Rainfall Totals and Percent of Normal (PON) across St Thomas and St John.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Observed	2.17	1.66	0.96	1.93	0.89	1.52	0.70	2.79	2.76	5.26	6.45	3.20
Normal	2.00	1.61	1.53	2.47	3.88	2.60	3.24	3.22	4.97	5.41	5.68	2.97
% PON per month	109	103	63	78	23	58	22	87	56	97	114	108
Accumulated	2.17	3.83	4.79	6.72	7.61	9.13	9.83	12.62	15.38	20.64	27.09	30.29
Normal accumulation	2.00	3.61	5.14	7.61	11.49	14.09	17.33	20.55	25.52	30.93	36.61	39.58
% PON accumulated	109	106	93	88	66	65	57	61	60	67	74	77

Table 3. 2015 Rainfall Totals and Percent of Normal (PON) across St Croix.

	Puerto Rico		San Juan Area		IST		ISX	
1	1967	44.31	1991	35.53	1991	19.52	2002	21.61
2	1994	46.79	1971	35.58	1994	24.38	2009	22.72
3	1997	49.51	1980	35.95	1976	25.19	2015	23.07
4	1976	49.93	1972	37.72	1964	26.23	2007	25.33
5	1991	50.49	2000	39.77	2000	27.70	1994	26.43
6	2015	51.64	1997	40.85	1957	30.92	1973	27.14
7	1957	53.47	1994	40.98	2002	32.16	1980	28.24
8	1947	54.77	2015	41.30	2001	33.56	1976	29.39
9	1973	54.94	1974	41.68	1988	34.37	1982	29.58
10	2000	58.04	1983	41.90	1959	34.80	2012	29.59

Table 4. Driest Years.

	Puerto Rico		San Juan Area		IST		ISX	
1	1960	103.74	2010	89.50	2010	61.38	1979	61.10
2	1963	90.20	2011	88.14	1960	56.97	2003	56.13
3	1979	88.92	1931	87.55	2005	55.29	1960	54.99
4	2011	88.55	2013	85.12	2003	51.93	1952	53.49
5	1961	88.36	1950	84.97	1974	50.34	1974	51.72
6	2003	87.78	1927	84.93	2015	50.25	1987	50.10
7	1970	87.38	1902	78.96	1981	49.34	2010	49.88
8	1998	85.25	1899	77.61	2004	48.48	2011	47.72
9	2010	83.51	2005	77.28	1954	46.92	1953	45.76
10	2005	83.37	1952	76.60	1958	46.30	1988	45.59

Table 5. Wettest Years.

At the primary climatological data sites, 2015 ended as the 3rd driest and 6th wettest year on record at Henry E. Rohlsen Airport in Saint Croix (TISX) and Cyril E King Airport in St Thomas (TIST). A rainfall total of 23.07 and 50.25 inches was observed at TISX and TIST, which is 15.60 inches below normal and 10.93 inches above normal, respectively. Above normal rainfall at TIST was associated with a localized extreme rainfall event during the month of February (Fig. 11). An induced trough left a rainfall total of 11.09 inches the night of February 13th and the morning of February 14th, which is 10.99 inches above the normal accumulation for those days. In terms of temperature, the mean annual temperature at TIST and TISX was 81.9 and 81.6ºF, which is 0.3 and 0.6 ºF above normal. Across the San Juan Area, 2015 ended as the 5th warmest and the 8th driest year on record in nearly 117 years of record (Table 4).

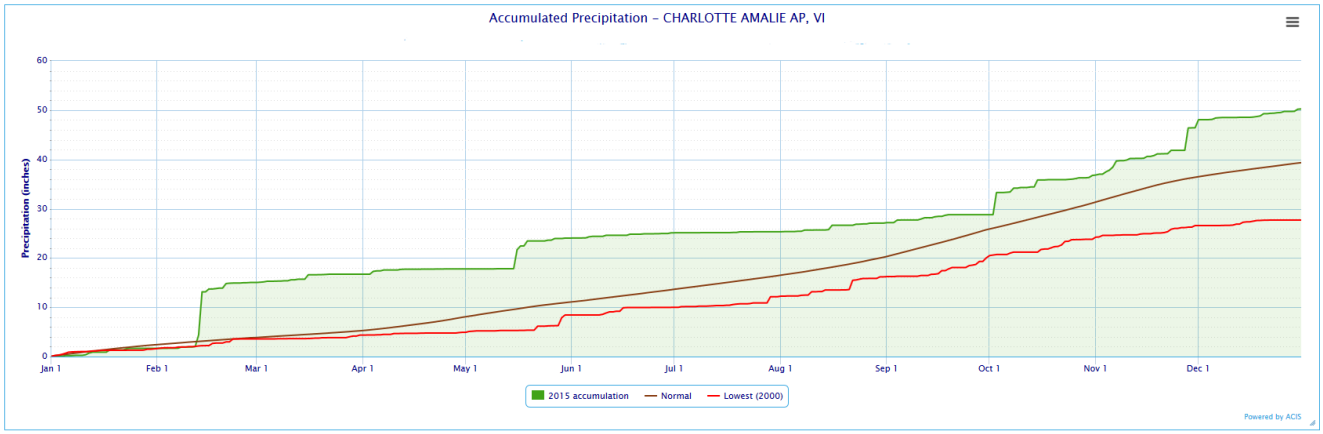


Figure 11. 2015 Rainfall Accumulation at IST.

Highlights for Primary Climatological Data Sites.

1. The **2nd highest rainfall accumulation observed in one day** at **Cyril E. King Airport St Thomas** was set on Feb 14th 2015. Rainfall activity was a result of an induced surface trough that moved across the area.

Rank	Inches	Date
1	11.86	9/8/1953
2	**8.73**	**2/14/2015**
3	6.86	9/15/2004
4	6.61	10/5/2010
5	5.83	9/9/1988

2. February 2015 ended as the **6th wettest month** for any given year at **Cyril E. King Airport St Thomas.**

Rank	Inches	Month and Year
1	18.39	Nov 2003
2	16.2	Oct 2010
3	14.94	Sep 1953
4	14.73	Nov 1984
5	13.89	Sep 2004
6	**13.35**	**Feb 2015**
7	12.86	Sep 2008
8	12.49	Oct 2005
9	12.45	Oct 1974
10	12.39	Oct 1954

3. 2015 ended as the **year with the 9th highest number of 90 degree days** at the **San Juan Area.**

Rank	Year	Number of days
1	1983	172
2	1980	164
3	1981	152
4	1982	121
5	1995	118
6	2005	109
7	2014	108
8	1987	107
9	**2015**	**105**
10	1984	104

4. 2015 ended as the **year with the 7th highest number of 90 degree days** at the **Henry E. Rohlsen Airport St Croix.**

Rank	Year	Number of days
1	1972	186
2	1998	160
3	1980	159
4	1997	141
5	1973	140
6	1993	134
7	**2015**	**117**
8	1999	99
9	1994	88
10	1977	88

5. 2015 ended as the **year with the 7th highest number of 80 degree nights** at the **San Juan Area**.

Rank	Year	Number of days
1	2009	59
2	2012	43
3	2014	42
4	1981	32
5	2010	30
6	1983	29
7	**2015**	**28**
8	1980	27
9	1995	25
10	2008	22

6. 2015 ended as the **year with the 2nd highest number of 80 degree nights** at the **Cyril E. King Airport St Thomas.**

Rank	Year	Number of days
1	**2010**	**106**
2	**2015**	**94**
3	**2005**	**74**
4	**2006**	**64**
5	**2003**	**64**
6	**1993**	**59**
7	**2012**	**57**
8	**1979**	**57**
9	**2013**	**52**
10	**2009**	**52**

Monthly and Seasonal Highlights for Primary Climatological Data Sites.

	Dec (2014)	Jan	Feb	Season
San Juan Area	– – –	**3rd warmest** (78.9ºF)	**6th warmest** (79.1ºF)	**5th warmest** (79.1ºF)
IST	– – –	– – –	**wettest February** (13.35") and **6th wettest month**	**Wettest** (17.70")
ISX	**8th wettest** (5.56")	**14th driest** (1.22")	**6th warmest** (79.0ºF)	– – –

Table 7. Winter 2015

	Mar	Apr	May	Season
San Juan Area	---	**4th warmest** (81.5ºF)	**15th driest** (2.28") and **5th warmest** (83.1ºF)	**5th driest** (5.16")and **6th warmest** (81.1ºF)
IST	---	**8th driest (1.08")**	**9th wettest** (6.25") and **10th warmest** (83.2ºF)	**14th warmest** (80.4ºF)
ISX	**10th driest** (0.76")	**7th driest** (0.59") and **7th warmest** (80.8ºF)	**9th warmest** (82.2ºF)and **12th driest** (1.05")	**2nd driest** (2.40")and **7th warmest** (80.5ºF)

Table 8. Spring 2015

	Jun	Jul	Aug	Season
San Juan Area	**17th driest** (2.11") and **8th warmest** (83.9ºF)	**4th driest** (1.61") and **9th warmest** (83.7ºF)	---	**11th driest** (9.65") and **10th warmest** (83.6ºF)
IST	**13th driest** (1.07") and **13th warmest** (83.7ºF)	**2nd driest** (0.22"), **8th driest month** , **5th warmest** (85.4ºF), the month of July with the most 80 degree nights, and 3rd longest streak -Tmin above 80 (ending 08/01)	**4th warmest** (85.4ºF) and **4th driest** (1.75") the 2nd month of Aug with the most 80 degree nights, the 2nd month on record with the most 80 degree nights	**driest** (3.04") and **3rd warmest** (84.8ºF)
ISX	**7th driest** (0.56") and **8th warmest** (84.0ºF)	**2nd driest** (0.77") and **10th warmest** (84.2ºF)	**9th warmest** (84.3ºF)	**4th driest** (4.33") and **6th warmest** (84.2ºF)

Table 9. Summer 2015

	Sep	Oct	Nov	Seson 2015
San Juan Area	**6th warmest** (84.3 ºF)	**Warmest** (84.6 ºF), **5th Driest** (1.77") and **13th Warmest month of any given year**	**7th warmest** (81.2 ºF)	**3rd warmest** (84.4 ºF)
IST	**5th driest** (1.71") and **5th warmest** (85.0 ºF)	**7th warmest** (83.6 ºF)	**7th wettest** (9.66")	**5th Warmest** (83.3 ºF)
ISX	**2nd driest** (1.27")	**2nd Warmest** (83.7 ºF)	**9th warmest** (81.3 ºF)	**3rd Warmest** (82.7 ºF)

Table 10. Fall 2015

	2015
San Juan Area	**8th driest** (41.30"), and **5th warmest** (81.9 ºF)
IST	**6th wettest** (50.25") and **4th warmest** (81.9 ºF)
ISX	**3rd driest** (23.07") and **3rd warmest** (81.6 ºF)

Table 11. 2015

Additional Highlights Based on COOP Data

Wettest Days

Station	Inches (inches)	Date
Aceituna	**6.00**	2/8/2015
Arecibo Obsy	**5.59**	5/16/2015
Aguirre	**5.24**	10/25/2015
Morovis 1 N	**4.92**	5/30/2015
Adjuntas Substn	**4.91**	10/26/2015

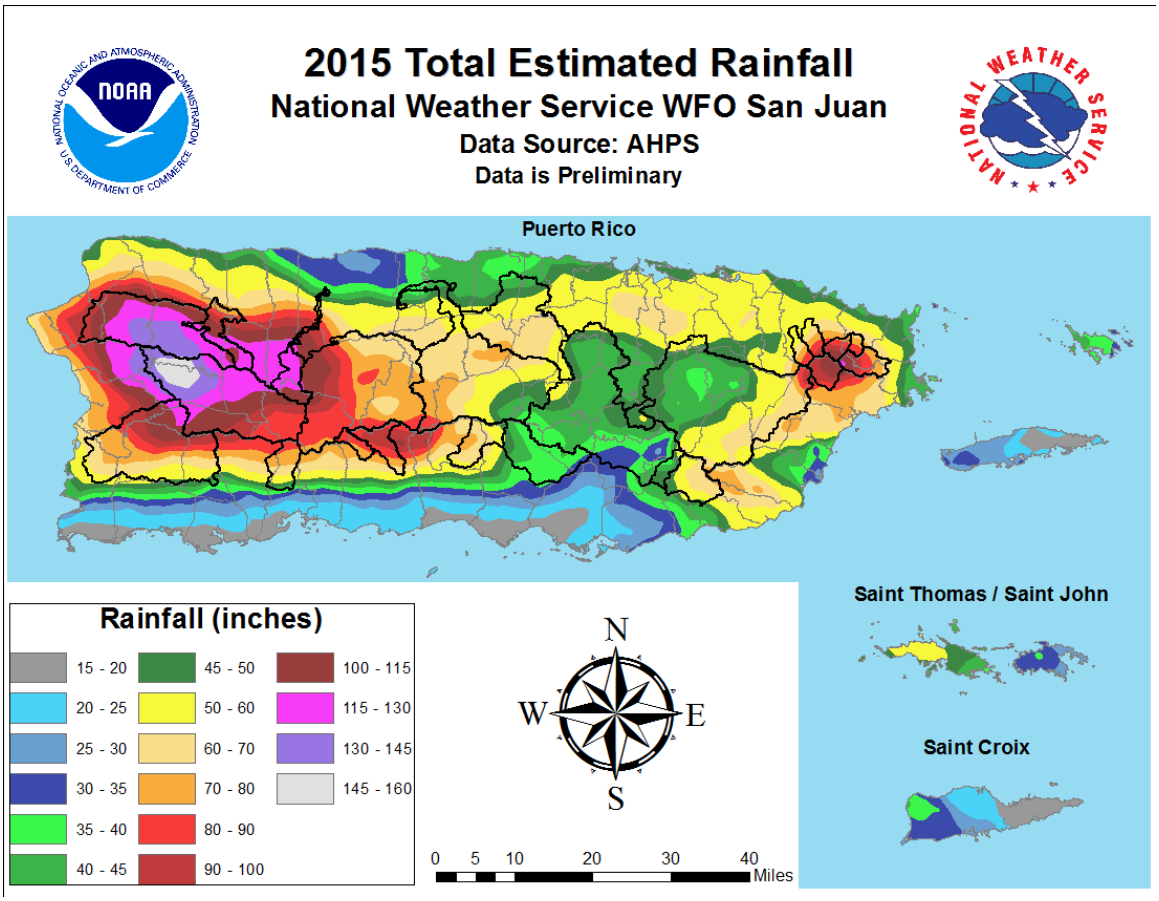
Highest Maximum Temperatures

Station	Temperature (ºF)	Date
Ponce 4 E	**99**	8/27/2015
Aguirre	**98**	9/12/2015
Toa Baja Levitown	**98**	10/5/2015
Lajas Substation	**97**	10/13/2015
Magueyes Island	**97**	8/21/2015

Lowest Minimum Temperatures

Station	Temperature (ºF)	Date
Toro Negro Forest	**48**	3/31/2015
Adjuntas Substn	**51**	3/8/2015
Ponce 4 E	**56**	1/20/2015
Maricao 2 SSW	**58**	4/22/2015

2015 Rainfall Distribution and Catchment Basins (click on the image to enlarge)



Data are preliminary and have not undergone final quality control by the National Centers for Environmental Information / NCEI/. Therefore, these data are subject to revision.

Puerto Rico Climate Record Period: 1940 to 2015
San Juan Metro Area Climate Record Period: 1898 to 2015 (Primary climatological site)
Cyril E. King Airport/St Thomas Climate Record Period: 1953 to 2015 (Primary climatological site)
Henry E. Rohlsen Airport/St Croix Climate Record Period: 1951 to 2015 (Primary climatological site)
Annual data - Less than 2% of missing values